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e-Health solution for the monitoring of patients and the interaction with medical staff

User Interface Design

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Chapter 1

Phase 2

1.1 Understanding and description

The application domain is e-Health, specifically focusing on monitoring patients remotely and facilitating interaction between patients and medical staff. This domain covers technologies that collect patient data (heart rate, glucose levels, oxygen levels) through a specially assigned bracelet and transmit it to healthcare providers for real-time monitoring.

In this project, the focus would be on building a system that tracks vital signs continuously and allows patients and medical staff to communicate efficiently.

For ease of access the patient will receive an unique bracelet and an intermediary device used to directly communicate with hospital staff through alerts and notifications. The collected vital signs will be available for both parties to visualize.

1.2 Users Identification

1. **Patients:** This category covers the people which suffer from conditions such as: heart diseases, diabetes or require monitorization during recovery from surgery. To make use of our services, the patients will require a basic understanding of technology usage (must know how to use a smartphone) and in special cases such as: elderly or children we'll provide features such as vocal commands or direct communication.

2. **Disabled Patients:** This category covers the people with disabilities such as: blindness, paralysis, deafness or muteness. We'll implement specific commands for each of this conditions: vocal commands, video recording for sign language, feedback through vibration or in extreme cases a trained caretaker able to use our services will be assigned.

3. **Medical Staff:** This category covers the people responsible for monitoring the patients and sending alarms or replying to requests.

4. **Caretakers:** This category covers trained people responsible with taking care of the people with special needs.

1.3 Description of use context

Use Contexts:

This system will primarily be used in home environments where patients live or recover. For medical staff, it will be used in clinics, hospitals, or remote offices to monitor patient data.

The system should function seamlessly in various conditions, including low internet connectivity. It may also be used in emergency situations to alert medical staff when a patient's condition worsens.

Interconnection with Other Tools/Systems:

1. **Bracelet:** this is the device responsible with collecting data from the user.
2. **Intermediary Device:** this device is used to display the collected data to the patient, sending data to the medical staff, receiving information and notifications.
3. **Tablet:** this device is used to display the data received from the intermediary device onto a tablet screen easily accessible to the medical staff. It provides ways to send alerts or directly communicate with the patient through video/audio calls (includes sign language, captions).

1.4 Description of the main challenges of the domain

Data Security and Privacy: Protecting sensitive health data is critical. Ensuring HIPAA or GDPR compliance for data handling and encryption is essential to avoid breaches

Usability for a Diverse User Base: The solution needs to cater to both tech-savvy and non-tech-savvy patients, as well as those with disabilities. Ensuring ease of use for different demographics can be challenging.

Real-time Data Accuracy and Reliability: False positives or missed alerts could lead to unnecessary anxiety or missed critical conditions. Ensuring the reliability of data transmission and processing is crucial.

1.5 Identify and shortly present the current solutions

Good solutions

Apple Health and Fitbit: These consumer health solutions provide seamless monitoring of vitals like heart rate and blood oxygen levels. They integrate with other apps and medical tools, making them user-friendly and accessible. However, they lack specific functionality for complex conditions or continuous real-time monitoring in a medical context.

Bad solutions

Basic Remote Monitoring Apps: Some apps collect data but don't offer comprehensive analytics or alert systems, making them insufficient for critical health monitoring. They may also lack proper encryption or compliance with health data regulations, which can lead to security vulnerabilities.

Chapter 2

Phase 2a

1. **Continuous Vital Signs Monitoring**
   (a) **Starting Point:** Data from the bracelet automatically syncs to the intermediary device and then to the app.
   (b) **User:** Medical staff (e.g., doctors, nurses).
   (c) **What:** Monitoring real-time vital signs like heart rate, blood pressure, glucose levels, and oxygen saturation.
   (d) **Why:** To detect early signs of deterioration or improvement in patient health conditions.
   (e) **Context:** Used in home environments for patients with chronic conditions and in clinics for immediate monitoring.
2. **Earn Rewards for Health Goals**
   (a) **Starting Point:** Patients access the rewards section via their app.
   (b) **User:** Patients.
   (c) **What:** Offering points or virtual rewards for achieving health goals, such as following a care plan or logging symptoms consistently.
   (d) **Why:** To increase patient engagement and adherence by making health management more interactive.
   (e) **Context:** Helpful for patients who may need extra motivation, such as young adults or those with chronic conditions.

Chapter 3

Phase 3

1. **Continuous Vital Signs Monitoring**
   (a) **Starting Point:** Data from the bracelet automatically syncs to the intermediary device and then to the app.
   (b) **User:** Medical staff.
   (c) **What:** Monitoring real-time vital signs like heart rate, blood pressure, glucose levels, and oxygen saturation.
   (d) **Why:** To detect early signs of deterioration or improvement in patient health conditions.
   (e) **Context:** Used in home environments for patients with chronic conditions and in clinics for immediate monitoring.
2. **Adjust Alert Sensitivity Settings**
   (a) **Starting Point:** Medical staff access the settings through the patient's profile on their tablet.
   (b) **User:** Medical staff.
   (c) **What:** Adjusting the threshold sensitivity for specific vitals like heart rate or glucose levels.
   (d) **Why:** To reduce false alarms or increase monitoring precision based on individual patient needs.
   (e) **Context:** Used during initial setup or when a patient's condition changes.
3. **Assign a Care Plan**
   (a) **Starting Point:** Medical staff access the care plan section through their tablet after a consultation.
   (b) **User:** Medical staff.
   (c) **What:** Creating or updating a personalized care plan that is transmitted to the patient's intermediary device.
   (d) **Why:** To ensure patients follow a structured regimen of medication, diet, and physical activity.
   (e) **Context:** Typically used after surgery or when adjusting treatments for chronic conditions.

4. **Send Medication Reminders via Intermediary Device**
   (a) **Starting Point:** Medical staff set reminders through their management interface.
   (b) **User:** Medical staff.
   (c) **What:** Configuring medication alerts that are sent to the patient's intermediary device.
   (d) **Why:** To ensure adherence to prescribed medication schedules.
   (e) **Context:** Vital for elderly patients or those who struggle with memory issues.

5. **Analyse Health Data Trends**
   (a) **Starting Point:** Medical staff access the analytics section through the tablet.
   (b) **User:** Medical staff.
   (c) **What:** Analysing trends in a patient's health data over time (e.g., blood glucose trends).
   (d) **Why:** To identify long-term patterns that could indicate improvement or deterioration.
   (e) **Context:** Commonly used during periodic reviews to adjust care plans or medication.

6. **Check Care Plan and Receive Alerts**
   (a) **Starting Point:** Patients accesses their care plan.
   (b) **User:** Patients.
   (c) **What:** Reviewing care plan and manage alerts.
   (d) **Why:** To make sure the care plan is followed correctly.
   (e) **Context:** Used every time the patients want to check their medication.

7. **Schedule Follow-up Consultations**
   (a) **Starting Point:** Patients access the scheduling section through the intermediary device.
   (b) **User:** Patients.
   (c) **What:** Scheduling remote follow-up appointments with their healthcare providers.
   (d) **Why:** To ensure consistent monitoring and discussion of ongoing health conditions without the need for in-person visits.
   (e) **Context:** Commonly used by patients recovering from surgery or managing chronic diseases.

8. **Earn Rewards for Health Goals**
   (a) **Starting Point:** Patients access the rewards section via their app.
   (b) **User:** Patients.
   (c) **What:** Offering points or virtual rewards for achieving health goals, such as following a care plan or logging symptoms consistently.
   (d) **Why:** To increase patient engagement and adherence by making health management more interactive.

(e) **Context:** Helpful for patients who may need extra motivation, such as young adults or those with chronic conditions.

9. **Record and Share Symptom Logs**

   (a) **Starting Point:** Patients access the symptom log section through the intermediary device.

   (b) **User:** Patients.

   (c) **What:** Recording daily symptoms (e.g., headaches, fatigue) and sharing with their assigned medical staff.

   (d) **Why:** To provide a comprehensive view of their daily health beyond just vital signs.

   (e) **Context:** Often used alongside continuous monitoring for a more holistic assessment.

10. **Initate Emergency Calls**

    (a) **Starting Point:** Patient activates the emergency call feature from their intermediary device.

    (b) **User:** Patients.

    (c) **What:** Sending an emergency voice or video call directly to medical staff.

    (d) **Why:** To provide immediate assistance during critical moments.

    (e) **Context:** Used in situations like shortness of breath or sudden heart palpitations.

11. **Receive Customized Exercise Program with Video Demonstrations**

    (a) **Starting Point:** Patients access a personalized exercise program on their intermediary device.

    (b) **User:** Patients.

    (c) **What:** Providing specific low-impact exercises tailored to the patient's mobility level, with video demonstrations for each exercise to ensure correct form.

    (d) **Why:** To encourage consistent, safe physical activity, helping prevent complications from inactivity and supporting rehabilitation or mobility goals.

    (e) **Context:** Especially valuable for elderly patients, those recovering from surgery, or individuals with physical limitations requiring modified exercises.

12. **Enable Video Calls with Sign Language Support and Captions**

    (a) **Starting Point:** Disabled patients access the video call feature through their intermediary device.

    (b) **User:** Patients with hearing impairments.

    (c) **What:** Connecting with medical staff using video calls that support sign language communication.

    (d) **Why:** To ensure clear communication without reliance on spoken language.

    (e) **Context:** Critical for deaf patients during remote consultations or emergencies.

Chapter 4

Phase 4

Low fidelity Figma prototype

Chapter 5

Phase 4a

Scenario 1: Continuous Vital Signs Monitoring

Starting Point: The patient's bracelet automatically syncs data to an intermediary device, which then sends it to a tablet app accessible by medical staff.

User: Medical staff.

UI Elements

- Real-time data dashboard with sections for heart rate, blood pressure, glucose levels, and oxygen saturation.
- Color-coded indicators for critical values (e.g., red for critical alerts, green for stable readings).
- Graphs showing trends for each vital sign.

System's Reaction and Display: Upon accessing the app, the medical staff sees a live feed of vital signs on the dashboard. If a reading reaches a critical threshold, the system highlights that data point in red and sends a sound notification to draw attention.

Success/Error Cases

- **Success Case:** All data syncs smoothly from the wearable device to the app. Medical staff receive real-time, accurate readings and can act upon any critical alerts promptly.
- **Error Case:** If data fails to sync, an error message appears, prompting the staff to check the connection with the intermediary device or the wearable. The app displays the last successfully synced data with a timestamp, ensuring the staff is aware of any delays.

Motivation: The chosen design prioritizes clarity and accessibility, using large fonts and color-coded alerts to make it easy for medical staff to interpret data quickly.

Scenario 2: Adjust Alert Sensitivity Settings

Starting Point: The medical staff accesses the settings through the patient's profile on their tablet.

User: Medical staff.

UI Elements

- Patient profile page with a "Settings" button.
- Sensitivity dropdown menu for each vital (e.g., heart rate, glucose levels) with labels indicating current thresholds.

System's Reaction and Display: When the medical staff taps on the "Settings" button within the patient's profile, they are directed to a page where they can adjust the alert sensitivity for each vital sign. The dropdown menu has preset levels but allow custom adjustments.

Success/Error Cases

- **Success Case:** The new sensitivity settings are saved, and alerts adjust accordingly. Medical staff are notified that future alerts will adhere to these updated thresholds.
- **Error Case:** If the app fails to save changes (e.g., due to a network issue), an error message appears, asking the staff to retry. The app temporarily holds the unsaved settings in the interface so they won't need to re-enter adjustments.

Motivation: The design is optimized for usability, using familiar elements like dropdown menus, making it easy for medical staff to fine-tune alert settings. Inspired by similar health monitoring systems, this design balances flexibility and ease of use, ensuring individualized patient care while minimizing false alarms.

Chapter 6

Phase 5

Scenario 1: Continuous Vital Signs Monitoring

Starting Point: The patient's bracelet automatically syncs data to an intermediary device, which then sends it to a tablet app accessible by medical staff.

User: Medical staff.

UI Elements

- Real-time data dashboard with sections for heart rate, blood pressure, glucose levels, and oxygen saturation.
- Color-coded indicators for critical values (e.g., red for critical alerts, green for stable readings).
- Graphs showing trends for each vital sign.

System's Reaction and Display: Upon accessing the app, the medical staff sees a live feed of vital signs on the dashboard. If a reading reaches a critical threshold, the system highlights that data point in red and sends a sound notification to draw attention.

Success/Error Cases

- **Success Case:** All data syncs smoothly from the wearable device to the app. Medical staff receive real-time, accurate readings and can act upon any critical alerts promptly.
- **Error Case:** If data fails to sync, an error message appears, prompting the staff to check the connection with the intermediary device or the wearable. The app displays the last successfully synced data with a timestamp, ensuring the staff is aware of any delays.

Motivation: The chosen design prioritizes clarity and accessibility, using large fonts and color-coded alerts to make it easy for medical staff to interpret data quickly.

Scenario 2: Adjust Alert Sensitivity Settings

Starting Point: The medical staff accesses the settings through the patient's profile on their tablet.

User: Medical staff.

UI Elements

- Patient profile page with a "Settings" button.
- Sensitivity dropdown menu for each vital (e.g., heart rate, glucose levels) with labels indicating current thresholds.

System's Reaction and Display: When the medical staff taps on the "Settings" button within the patient's profile, they are directed to a page where they can adjust the alert sensitivity for each vital sign. The dropdown menu has preset levels but allow custom adjustments.

Success/Error Cases

- **Success Case:** The new sensitivity settings are saved, and alerts adjust accordingly. Medical staff are notified that future alerts will adhere to these updated thresholds.
- **Error Case:** If the app fails to save changes (e.g., due to a network issue), an error message appears, asking the staff to retry. The app temporarily holds the unsaved settings in the interface so they won't need to re-enter adjustments.

Motivation: The design is optimized for usability, using familiar elements like dropdown menus, making it easy for medical staff to fine-tune alert settings. Inspired by similar health monitoring systems, this design balances flexibility and ease of use, ensuring individualized patient care while minimizing false alarms.

Scenario 3: Assign a Care Plan

Starting Point: Medical staff access the care plan section through their tablet after a consultation.

User: Medical staff.

UI Elements

- Care plan template.
- Text fields for personalized instructions.
- Buttons for "Save" and "Transmit to Patient."
- Confirmation pop-up after saving.

System's Reaction and Display: The system displays a form where medical staff can create a new plan. After filling the details, selecting "Transmit to Patient" generates a success message and notifies the patient's device.

Success/Error Cases

- **Success Case:** Care plan is saved and successfully transmitted to the patient.
- **Error Case:** Missing required fields prompts an error message with highlighted fields.

Motivation: This design ensures an efficient workflow by utilizing a single, customizable template, which reduces manual input. The interface adheres to user-centered design principles, minimizing cognitive load and streamlining task completion.

Scenario 4: Send Medication Reminders via Intermediary Device

Starting Point: Medical staff set reminders through their management interface.

User: Medical staff.

UI Elements

- Calendar view for scheduling.
- Notifications panel for confirmation of sent reminders.

System's Reaction and Display: Selecting a date and time schedules the reminders, which are displayed on the patient's intermediary device. Notifications confirm successful scheduling.

Success/Error Cases

- **Success Case:** Reminder is set and synced to the device.
- **Error Case:** Invalid time inputs trigger an error message.

Motivation: By using a familiar calendar interface, this design aligns with usability best practices, ensuring seamless interaction and reducing scheduling errors.

Scenario 5: Analyse Health Data Trends

Starting Point: Medical staff access the analytics section through the tablet.

User: Medical staff.

UI Elements

- Interactive graphs for metrics like blood glucose.
- Filters for specific timeframes.
- Filters for specific metrics.

System's Reaction and Display: Graphs load dynamically based on selected metrics and filters.

Success/Error Cases

- **Success Case:** Data displays accurately and is presented in a clear, interactive format for analysis.
- **Error Case:** Unavailable data prompts an error message with troubleshooting options.

Motivation: A visual-first approach aids in identifying trends quickly, while dynamic filtering enhances task efficiency.

Scenario 6: Check Care Plan and Receive Alerts

Starting Point: Patients access their care plan.

User: Patients.

UI Elements

- List view of daily tasks (e.g., medication, exercises).
- Color-coded alerts (e.g., red for overdue tasks).
- Real-time alerts displayed through notifications.

System's Reaction and Display: Patients view their care plan, with overdue tasks highlighted. Notifications are displayed as banners with actionable buttons like "Yes" or "Later".

Success/Error Cases

- **Success Case:** Patients complete tasks and see progress updates.
- **Error Case:** Missed alerts trigger follow-up notifications.

Motivation: Color-coded alerts enhance clarity, while actionable notifications ensure patients stay on track.

Scenario 7: Schedule Follow-up Consultations

Starting Point: Patients access the scheduling section through the intermediary device.

User: Patients.

UI Elements

- Calendar with available slots.
- Confirmation screen with appointment details.
- Button for "Submit".

System's Reaction and Display: Available slots are displayed based on the system's predefined schedule. Upon selecting a slot, the system shows a confirmation screen with the appointment details.

Success/Error Cases

- **Success Case:** The appointment is successfully scheduled, and the patient receives a notification with the details.
- **Error Case:** If a slot becomes unavailable due to a conflict, the system prompts the patient to select another slot.

Motivation: A user-friendly calendar interface minimizes scheduling errors and provides flexibility for patients to manage their follow-up consultations easily.

Scenario 8: Earn Rewards for Health Goals

Starting Point: Patients access the rewards section via their app.

User: Patients.

UI Elements

- Display of accumulated points.
- List of participating pharmacies where points can be redeemed.

System's Reaction and Display: As patients accumulate points by completing health goals, the system updates the total points in real-time and displays a list of participating pharmacies where the points can be redeemed.

Success/Error Cases

- **Success Case:** Patients successfully view their accumulated points and locate a participating pharmacy to redeem them.
- **Error Case:** If pharmacy information is unavailable, the system notifies the patient and suggests checking again later.

Motivation: Incorporating gamification and real-time feedback enhances user engagement and motivation to achieve health goals.

Scenario 9: Record and Share Symptom Logs

Starting Point: Patients access the symptom log section through the intermediary device.

User: Patients.

UI Elements

- Real-time data dashboard with sections for heart rate, blood pressure, glucose levels, and oxygen saturation.
- Color-coded indicators for critical values (e.g., red for critical alerts, green for stable readings).

- Graphs showing trends for each vital sign.

System's Reaction and Display: Upon accessing the app, the patient sees a live feed of vital signs on the dashboard. If a reading reaches a critical threshold, the system highlights that data point in red to draw attention.

Success/Error Cases

- **Success Case:** All data syncs smoothly from the wearable device to the app. Patients receive real-time, accurate readings.
- **Error Case:** If data fails to sync, an error message appears, prompting the patient to check the connection with the intermediary device or the wearable. The app displays the last successfully synced data with a timestamp, ensuring the patient is aware of any delays.

Motivation: The chosen design prioritizes clarity and accessibility, using large fonts and color-coded alerts to make it easy for patients to interpret data quickly.

Scenario 10: Initiate Emergency Calls

Starting Point: Patients activate the emergency call feature from their intermediary device.

User: Patients.

UI Elements

- Large "HELP" button for immediate access.
- Confirmation dialog to prevent accidental activation.

System's Reaction and Display: Activating the emergency call connects the patient with medical staff.

Success/Error Cases

- **Success Case:** The call connects smoothly, allowing real-time communication with medical staff.
- **Error Case:** If the call fails, the system displays an error message indicating the connection issue and advises the patient to try again.

Motivation: A clear and accessible design ensures patients can initiate emergency calls quickly and reliably during critical situations.

Scenario 11: Receive Customized Exercise Program with Video Demonstrations

Starting Point: Patients access a personalized exercise program on their intermediary device.

User: Patients.

UI Elements

- Video thumbnails for each exercise.
- Play/Pause buttons for video controls.

System's Reaction and Display: Selecting an exercise opens a video player with guided instructions.

Success/Error Cases

- **Success Case:** Videos play smoothly.
- **Error Case:** If a video fails to load, the system suggests retrying or switching to a different exercise.

Motivation: Providing clear guidance through video demonstrations ensures patients perform exercises correctly, supporting rehabilitation and health goals.

Scenario 12: Enable Video Calls with Sign Language Support and Captions

Starting Point: Patients with hearing impairments access the video call feature through their intermediary device.

User: Patients with hearing impairments.

UI Elements

- Video call interface with live captions.
- Toggle option for sign language interpreter overlay.

System's Reaction and Display: The system connects to a video call and displays live captions. Patients can enable or disable the sign language interpreter overlay during the call.

Success/Error Cases

- **Success Case:** The call connects successfully, with captions and sign language support active.
- **Error Case:** If a feature fails, the system notifies the user and suggests retrying.

Motivation: Integrating accessibility features ensures inclusive communication for patients with hearing impairments, enhancing their healthcare experience.

Task 3: Assign a Care Plan

Scenario 1: The medical staff uses the care plan template to create a plan focusing on post-surgical recovery, adding reminders for follow-up activities like medication and physiotherapy sessions. Upon submitting, the system confirms the plan's successful transmission, and the patient receives the plan later that evening without issues.
Scenario 2: If the patient is unable to independently take their medication or perform the prescribed exercises, another individual will assist in completing these tasks.

Task 8: Earn Rewards for Health Goals

Scenario 1: The patient completes their health goals, such as logging their symptoms daily or following their care plan. The app updates their accumulated points in real time and displays a list of nearby participating pharmacies where they can redeem their rewards. This encourages consistent engagement with their health plan.
Scenario 2: If the patient is unsure how to redeem their points, the app provides an instructional guide accessible through the rewards section. This guide includes step-by-step instructions on using their points at participating pharmacies, ensuring a smooth redemption process.

Task 10: Initiate Emergency Calls

Scenario 1: The patient experiences sudden dizziness and presses the "HELP" button on their app. The system connects them to the healthcare team immediately, allowing real-time communication. The team provides instructions to stabilize the situation while dispatching help.
Scenario 2: The patient should be able to call out "help" if they are unable to type, and the tablet should be able to detect this command.

Task 11: Receive Customized Exercise Program with Video Demonstrations

Scenario 1: The patient opens the exercise program and selects a video for a low-impact stretching routine. The video loads smoothly, and the patient follows along, completing the session. Upon finishing, the app marks the session as completed and updates their progress tracker.
Scenario 2: If the specific exercise videos for the patient fail to load, they have the option to access a page containing all available videos and use a search function to find the ones they need.

Chapter 7

Phase 5a

Scenario 1: Continuous Vital Signs Monitoring

Analysis of each step of the scenario

- Step 1: The patient's bracelet automatically syncs data to an intermediary device.
- Step 2: The intermediary device sends data to a tablet app accessible by medical staff.
- Step 3: The medical staff accesses the app and sees a live dashboard of vital signs.
- Step 4: If a reading reaches a critical threshold, the system highlights it in red and sends a sound notification.
- Step 5: The staff taps on the reading for more detailed data, viewing graphs and trends over time.

User's intent to produce the effect

The medical staff's goal is to monitor the patient's vital signs in real time and respond promptly to critical alerts.

Visibility of the correct control

The real-time dashboard is clearly displayed upon accessing the app, and critical alerts are prominently highlighted in red for immediate visibility.

Confirmation of control producing the desired effect

Accessing the detailed graphs and trends is done through a dedicated section in the app, allowing the staff to analyze specific vital signs efficiently.

Potential for selecting an incorrect control

The interface is intuitive and focused on vital sign monitoring, minimizing the likelihood of incorrect selections.

Clarity of feedback to proceed correctly

The system provides clear visual and auditory feedback for critical alerts, ensuring the medical staff knows when immediate action is required.

Presentation of the evaluation outcome and improvements

Outcome: The scenario supports efficient real-time monitoring and critical alert management.
Improvements: Add a brief summary section on the dashboard to highlight recent trends or any repeated critical alerts for better situational awareness.

Scenario 2: Adjust Alert Sensitivity Settings

Analysis of each step of the scenario

- Step 1: The medical staff accesses the patient's profile on their tablet.
- Step 2: They tap the "Settings" button to navigate to the alert sensitivity page.
- Step 3: The staff adjusts the alert sensitivity thresholds using dropdown menus.
- Step 4: The system saves the new settings, confirming that alerts will now adhere to the updated thresholds.

User's intent to produce the effect

The medical staff's goal is to fine-tune alert thresholds to ensure accurate and actionable notifications.

Visibility of the correct control

The "Settings" button is clearly labeled and located within the patient's profile, making it easy to find and select.

Confirmation of control producing the desired effect

Once the new settings are saved, the system provides a confirmation message, ensuring the staff knows the thresholds have been updated successfully.

Potential for selecting an incorrect control

The settings page is specifically designed for adjusting alert sensitivity, and the dropdown menus are clearly labeled for each vital sign.

Clarity of feedback to proceed correctly

The confirmation message indicates that the changes have been saved, and unsaved settings are temporarily held in case of errors, ensuring the user can proceed without confusion.

Presentation of the evaluation outcome and improvements

Outcome: The scenario ensures easy and accurate adjustment of alert thresholds, improving patient-specific care.
Improvements: Include tooltips or brief explanations for each sensitivity threshold to guide the user in making informed adjustments.

Chapter 8

Phase 6

Scenario 1: Continuous Vital Signs Monitoring

Analysis of each step of the scenario

- Step 1: The patient's bracelet automatically syncs data to an intermediary device.
- Step 2: The intermediary device sends data to a tablet app accessible by medical staff.
- Step 3: The medical staff accesses the app and sees a live dashboard of vital signs.
- Step 4: If a reading reaches a critical threshold, the system highlights it in red and sends a sound notification.
- Step 5: The staff taps on the reading for more detailed data, viewing graphs and trends over time.

User's intent to produce the effect

The medical staff's goal is to monitor the patient's vital signs in real time and respond promptly to critical alerts.

Visibility of the correct control

The real-time dashboard is clearly displayed upon accessing the app, and critical alerts are prominently highlighted in red for immediate visibility.

Confirmation of control producing the desired effect

Accessing the detailed graphs and trends is done through a dedicated section in the app, allowing the staff to analyze specific vital signs efficiently.

Potential for selecting an incorrect control

The interface is intuitive and focused on vital sign monitoring, minimizing the likelihood of incorrect selections.

Clarity of feedback to proceed correctly

The system provides clear visual and auditory feedback for critical alerts, ensuring the medical staff knows when immediate action is required.

Presentation of the evaluation outcome and improvements

Outcome: The scenario supports efficient real-time monitoring and critical alert management.
Improvements: Add a brief summary section on the dashboard to highlight recent trends or any repeated critical alerts for better situational awareness.

Scenario 2: Adjust Alert Sensitivity Settings

Analysis of each step of the scenario

- Step 1: The medical staff accesses the patient's profile on their tablet.
- Step 2: They tap the "Settings" button to navigate to the alert sensitivity page.
- Step 3: The staff adjusts the alert sensitivity thresholds using dropdown menus.
- Step 4: The system saves the new settings, confirming that alerts will now adhere to the updated thresholds.

User's intent to produce the effect

The medical staff's goal is to fine-tune alert thresholds to ensure accurate and actionable notifications.

Visibility of the correct control

The "Settings" button is clearly labeled and located within the patient's profile, making it easy to find and select.

Confirmation of control producing the desired effect

Once the new settings are saved, the system provides a confirmation message, ensuring the staff knows the thresholds have been updated successfully.

Potential for selecting an incorrect control

The settings page is specifically designed for adjusting alert sensitivity, and the dropdown menus are clearly labeled for each vital sign.

Clarity of feedback to proceed correctly

The confirmation message indicates that the changes have been saved, and unsaved settings are temporarily held in case of errors, ensuring the user can proceed without confusion.

Presentation of the evaluation outcome and improvements

Outcome: The scenario ensures easy and accurate adjustment of alert thresholds, improving patient-specific care.
Improvements: Include tooltips or brief explanations for each sensitivity threshold to guide the user in making informed adjustments.

Scenario 3: Assign a Care Plan

Analysis of each step of the scenario

- Step 1: The medical staff accesses the care plan section on their tablet.
- Step 2: They tap "Plan" to navigate to the care plan interface.
- Step 3: The staff fills out a template with instructions.
- Step 4: They tap "Transmit to Patient" to send the plan.
- Step 5: The system confirms the transmission.

User's intent to produce the effect

The medical staff's goal is to assign a care plan to ensure patients follow a structured regimen.

Visibility of the correct control

The care plan section is prominently displayed within the interface, making it easy to find and access.

Confirmation of control producing the desired effect

Once the staff taps "Transmit to Patient," the system provides a confirmation message, verifying the successful transmission of the care plan.

Potential for selecting an incorrect control

The interface is straightforward and focused, with limited distractions, minimizing the likelihood of selecting an incorrect control.

Clarity of feedback to proceed correctly

The system provides clear confirmation feedback, ensuring the staff understands that the care plan has been transmitted successfully.

Presentation of the evaluation outcome and improvements

Outcome: The task supports efficient care plan creation and transmission, ensuring patients receive the necessary instructions.
Improvements: Highlight mandatory fields in the care plan template to reduce errors and ensure all required information is completed before transmission.

Scenario 4: Send Medication Reminders

Analysis of each step of the scenario

- Step 1: The medical staff sets reminders via a calendar interface.
- Step 2: They tap "Alert" to navigate to the reminder interface.
- Step 3: The staff schedules the reminders.
- Step 4: They tap "Set" to send the medication reminder.
- Step 5: Notifications confirm successful scheduling.

User's intent to produce the effect

The medical staff's goal is to set medication reminders to ensure patients take their medications on time.

Visibility of the correct control

The calendar interface is intuitive and familiar, making it easy for the staff to identify and access the reminder settings.

Confirmation of control producing the desired effect

Once reminders are scheduled, the system provides clear notifications confirming the successful scheduling of alerts.

Potential for selecting an incorrect control

The interface is task-specific, with limited options, reducing the likelihood of selecting an incorrect control.

Clarity of feedback to proceed correctly

The system provides detailed and clear notifications, ensuring the staff understands that the reminders have been successfully scheduled.

Presentation of the evaluation outcome and improvements

Outcome: Scheduling medication reminders is intuitive and reliable, supporting effective patient medication adherence.
Improvements: Introduce a batch scheduling feature to allow staff to set multiple reminders simultaneously, improving efficiency.

Scenario 5: Analyse Health Data Trends

Analysis of each step of the scenario

- Step 1: The medical staff accesses the analytics section on a tablet.
- Step 2: They tap "Archive" to navigate to the archive screen.
- Step 3: The staff selects metrics and filters for graphs.
- Step 4: Interactive graphs displaying trends are viewed.

User's intent to produce the effect

The medical staff's goal is to analyse trends in the patient's health data to aid in long-term care planning.

Visibility of the correct control

The analytics section is prominently labelled, making it easy for the staff to locate and access the relevant controls.

Confirmation of control producing the desired effect

Graphs update dynamically based on the selected metrics and filters, confirming the action and providing immediate feedback.

Potential for selecting an incorrect control

The filters and controls are clearly associated with the graphs, minimizing the likelihood of selecting an incorrect option.

Clarity of feedback to proceed correctly

The visual updates to the graphs ensure that the staff can easily understand and interpret the feedback provided by the system.

Presentation of the evaluation outcome and improvements

Outcome: The interface facilitates efficient analysis of health data trends, supporting informed decision-making for patient care.
Improvements: Introduce export options to allow data sharing and offline analysis, enhancing collaboration and accessibility.

Scenario 6: Check Care Plan and Receive Alerts

Analysis of each step of the scenario

- Step 1: Patients access their care plan.
- Step 2: They open the menu and tap on "Plan."
- Step 3: Patients view alerts and task progress.
- Step 4: Tasks are completed, and the app is updated.

User's intent to produce the effect

The patient's goal is to use alerts to stay on track with their care plan and ensure tasks are completed as prescribed.

Visibility of the correct control

The alerts are color-coded and clearly displayed, making them easily noticeable and accessible for patients.

Confirmation of control producing the desired effect

Task progress updates immediately upon completion, confirming the desired effect and keeping the patient informed.

Potential for selecting an incorrect control

The interface is focused and intuitive, reducing the likelihood of selecting an incorrect option.

Clarity of feedback to proceed correctly

Notifications provide clear and actionable feedback, ensuring patients can proceed confidently with their tasks.

Presentation of the evaluation outcome and improvements

Outcome: The feature effectively supports patient adherence to the care plan, ensuring tasks are completed on time.
Improvements: Add reminders for overdue tasks to further assist patients in maintaining adherence.

Scenario 7: Initiate Emergency Calls

Analysis of each step of the scenario

- Step 1: The patient presses the "HELP" button on the app.
- Step 2: The system connects the patient to medical staff.

User's intent to produce the effect

The patient's goal is to initiate an emergency call quickly during a health crisis to receive immediate assistance.

Visibility of the correct control

The "HELP" button is large and prominently displayed, ensuring it is easy to locate and activate in an emergency.

Confirmation of control producing the desired effect

Once the button is pressed, the connection initiates immediately, providing clear feedback that the emergency call is in progress.

Potential for selecting an incorrect control

The design is straightforward, with no confusing or unnecessary options, minimizing the possibility of selecting an incorrect control.

Clarity of feedback to proceed correctly

Feedback, such as visual and audio indicators, confirms the call is in progress, ensuring the patient understands that help is on the way.

Presentation of the evaluation outcome and improvements

Outcome: The task supports quick and reliable emergency calls, ensuring patients can access help during critical moments.
Improvements: Add voice activation for hands-free use, providing an additional layer of accessibility for patients who cannot physically press the button.

Scenario 8: Earn Rewards for Health Goals

Analysis of each step of the scenario

- Step 1: Patients access the rewards section.
- Step 2: They open the menu and tap on "Favour Points."
- Step 3: Patients view their points and redeem them at participating pharmacies.

User's intent to produce the effect

The patient's goal is to check their accumulated points and redeem them as a reward for meeting health goals, thereby increasing motivation and engagement.

Visibility of the correct control

The rewards section is clearly labeled and easily accessible, ensuring patients can quickly locate the feature.

Confirmation of control producing the desired effect

The points update in real time, providing immediate feedback that their progress is being tracked accurately.

Potential for selecting an incorrect control

The interface is simple and focused, minimizing the likelihood of selecting an incorrect control.

Clarity of feedback to proceed correctly

Clear instructions guide the process, ensuring patients understand how to view and redeem their points effectively.

Presentation of the evaluation outcome and improvements

Outcome: The feature enhances patient engagement by providing rewards for meeting health goals, motivating continued adherence.
Improvements: Include more detailed redemption instructions to make the process smoother and more accessible.

Chapter 9

Phase 7a

Group 1: Continuous Monitoring and Alerts

1. **Continuous Vital Signs Monitoring**
    - **Compliance with Heuristics**: Real-time syncing ensures visibility of system status and provides relevant health information.
    - **Example**: Heart rate and oxygen levels update instantly on the app.
    - **Problem**: Sync delays or data lags.
    - **Solution**: Add timestamps and buffering indicators to clarify data freshness.
    - **Improvement**: Patients and staff are reassured about data reliability.
2. **Adjust Alert Sensitivity Settings**
    - **Compliance with Heuristics**: Allows flexibility and user control for managing alerts.
    - **Example**: Adjusting glucose level thresholds based on patient needs.
    - **Problem**: No immediate feedback when changes are saved.
    - **Solution**: Implement confirmation messages after updates.
    - **Improvement**: Reduced uncertainty when configuring settings.
3. **Send Medication Reminders via Intermediary Device**
    - **Compliance with Heuristics**: Promotes adherence through error prevention with scheduled alerts.
    - **Example**: Sends audible reminders for critical medications.
    - **Problem**: Lack of personalization options.
    - **Solution**: Add options for text, sound, or vibration alerts.
    - **Improvement**: Enhances accessibility for diverse patient needs.

Summary of Findings and Improvements

This evaluation of Group 1 tasks demonstrates a system that is largely compliant with Jakob Nielsen's heuristics. However, issues such as syncing delays, lack of immediate feedback, and limited customization options were identified. The proposed solutions aim to enhance system reliability, usability, and accessibility, improving both the medical staff's workflow and patient outcomes.

Chapter 10

Phase 8

Introduction

This report evaluates the user interface designed for **Continuous Vital Signs Monitoring** and related tasks using Jakob Nielsen's **Ten Usability Heuristics**. The evaluation identifies compliance with heuristics, highlights design problems, and proposes solutions to improve the user experience.

Evaluation of Groups and Tasks

Group 1: Continuous Monitoring and Alerts

1. **Continuous Vital Signs Monitoring**
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    - **Example**: Sends audible reminders for critical medications.
    - **Problem**: Lack of personalization options.
    - **Solution**: Add options for text, sound, or vibration alerts.
    - **Improvement**: Enhances accessibility for diverse patient needs.

Group 2: Personalized Care Plans

1. **Assign a Care Plan**
    - **Compliance with Heuristics**: Consistency ensures structured care plans are easy to follow.
    - **Example**: Tailored plans with medication, diet, and physical activity.
    - **Problem**: Complex navigation to set up plans.
    - **Solution**: Add a guided setup wizard for streamlined navigation.
    - **Improvement**: Reduces staff workload during initial setups.
2. **Analyse Health Data Trends**
    - **Compliance with Heuristics**: Simplified charts help staff recognize patterns and diagnose trends.
    - **Example**: A glucose trend line with flagged anomalies.
    - **Problem**: Overwhelming data visualization.
    - **Solution**: Use simplified graphs with actionable insights.
    - **Improvement**: Enhances decision-making efficiency.
3. **Earn Rewards for Health Goals**
    - **Compliance with Heuristics**: Aesthetic design makes engagement fun and rewarding.
    - **Example**: Virtual badges for achieving daily step counts.
    - **Problem**: Not appealing to all users.
    - **Solution**: Add an option to disable gamification.
    - **Improvement**: Ensures relevance for diverse user preferences.

Group 3: Patient Self-Management

1. **Check Care Plan and Receive Alerts**
    - **Compliance with Heuristics**: Notifications keep patients informed about their care plans.
    - **Example**: Clear alerts for missed medications.
    - **Problem**: Alerts might be overlooked.
    - **Solution**: Design more distinct notifications with colors or sounds.
    - **Improvement**: Ensures adherence to the care plan.
2. **Record and Share Symptom Logs**
    - **Compliance with Heuristics**: Enables patients to add custom notes for symptoms.
    - **Example**: Daily headache logs shared with medical staff.
    - **Problem**: Difficult to filter logs.
    - **Solution**: Add date and symptom filters.

- **Improvement**: Simplifies the process of reviewing symptom history.

3. **Schedule Follow-up Consultations**
    - **Compliance with Heuristics**: Flexible scheduling improves patient convenience.
    - **Example**: Patients choose preferred slots for remote follow-ups.
    - **Problem**: No real-time availability updates.
    - **Solution**: Enable real-time slot availability.
    - **Improvement**: Reduces appointment conflicts.

Group 4: Accessibility and Emergency Features

1. **Initiate Emergency Calls**
    - **Compliance with Heuristics**: Easy-to-access emergency feature enhances safety.
    - **Example**: One-tap emergency call for heart palpitations.
    - **Problem**: Risk of accidental triggers.
    - **Solution**: Add a confirmation step before initiating calls.
    - **Improvement**: Ensures reliability during emergencies.

2. **Receive Customized Exercise Program with Video Demonstrations**
    - **Compliance with Heuristics**: Videos ensure correct form and encourage safe activity.
    - **Example**: A low-impact exercise demo for mobility-limited patients.
    - **Problem**: Videos may not load due to connectivity issues.
    - **Solution**: Provide offline download options.
    - **Improvement**: Ensures usability in all environments.

3. **Enable Video Calls with Sign Language Support and Captions**
    - **Compliance with Heuristics**: Matches real-world needs for hearing-impaired patients.
    - **Example**: Video calls with sign language interpreters.
    - **Problem**: Availability of interpreters during emergencies.
    - **Solution**: Integrate AI-based sign language translation.
    - **Improvement**: Enhances communication and reduces reliance on human interpreters.

Summary of Findings and Improvements

The evaluation highlights strengths such as real-time monitoring, flexibility, and minimalistic design. However, issues such as cluttered interfaces, limited customization, and potential delays were identified. Implementing the proposed solutions will improve usability, enhance user satisfaction, and ensure compliance with the heuristics.